

A Science Magazine from CTW, the Creators of Sesame Street.

May 1982

321 CONTACTTM

Special
Desert
Issue!



This animal with the fancy headgear is a desert bighorn sheep. Its huge horns are pretty heavy to carry around. But the sheep doesn't mind. They come in handy whenever the animal gets thirsty. It uses its horns to rip open a barrel cactus, the round desert plant that stores water. The sheep drinks the cactus liquid and chews its juicy pulp.

Other desert animals have learned a few neat survival tricks of their own. To find out how different animals live in the American desert, turn to page 14.

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Page 4



Page 8

21 CONTACT

Page 12



Page 14



Page 18



Page 22



Page 32



Featuring This Month

- 4** Solar Hogan: A Navaho Indian Home with a New Idea
- 12** Oasis: A Desert Board Game
- 14** Desert Survivors: Plants and Animals of the American Southwest
- 20** Desert Poster
- 24** The Bloodhound Gang: The Case of the Whispering Pirate (Part Two)

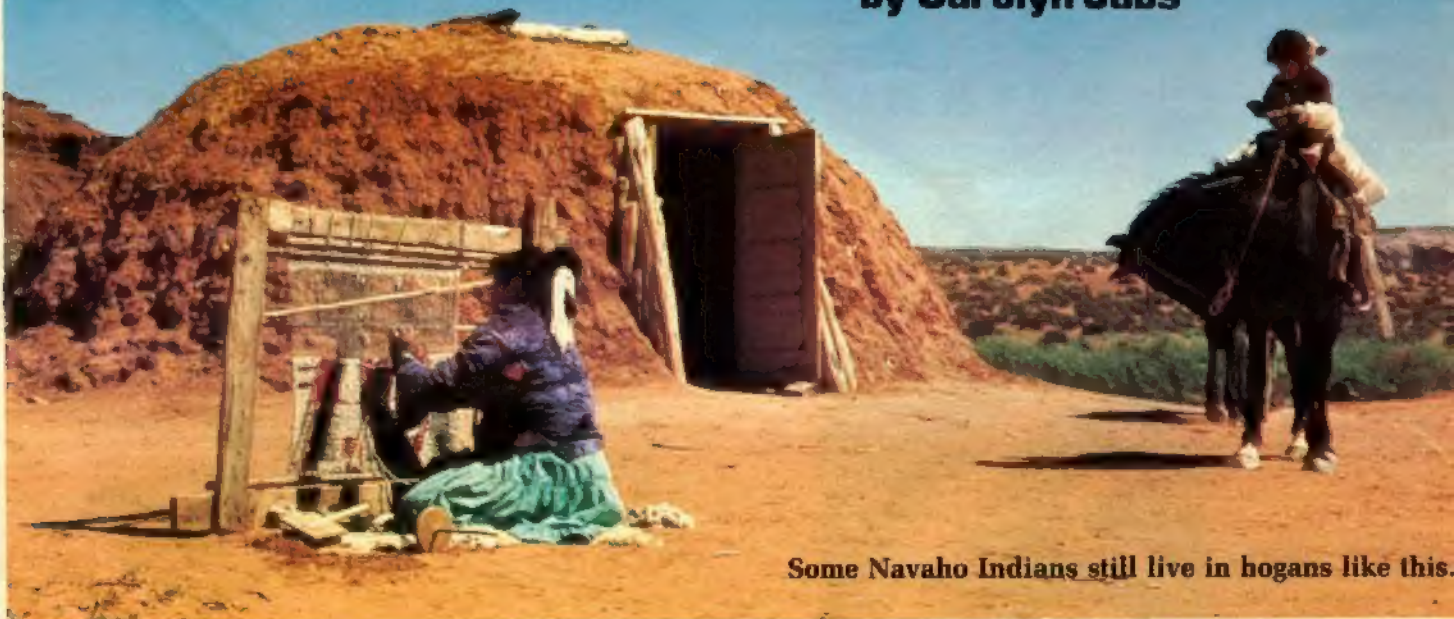
Plus Our Regular Departments

- 6** Factoids
- 10** List of the Month: Hot Spots?
- 18** Any Questions?
- 22** Contact Report
- 27** Do It!: Word Hunt
- 28** Busy Bodies: Genes
- 32** Mail
- 34** Reviews & Previews
- 36** Experiment: Solar Apple Cooker
- 37** Did It!: Word Hunt Answers
- 39** Earth Works: Oases

Navaho boys worked hard to build this modern hogan.

Solar Hogan

**A
NAVAHO INDIAN
HOME WITH A NEW IDEA**
by Carolyn Jabs



Some Navaho Indians still live in hogans like this.

Alvin Nez didn't like school. So when his teacher talked, sometimes the boy didn't listen. Alvin, a Navaho Indian, lived on the Navaho reservation in Arizona and went to high school there. Along with some of the other students, he sometimes found school boring. It didn't seem to have much to do with his interests or his plans for the future. Alvin liked the Navaho way of living, so he would daydream about it during class. Often, he imagined going out alone into the desert.

At other times, the boy thought about his family's hogan. A hogan is the kind of home that Navaho Indians have lived in for hundreds of years. It has one big room which is surrounded by eight walls. The walls are packed with earth. According to Navaho stories, the first hogan was a dome which was covered by the "rays of sunlight and the beams of the rainbow."

To Alvin and his people, the hogan is worthy of great respect. For many of them, it is still where they live today. And even for Navahos who live in ordinary houses, the hogan remains special. It is a place where the people can hold their tribal ceremonies. Medicine men chant the ancient songs. Other people make beautiful pictures on the dirt floor using colored sand.

A teacher named Richard Birkey was interested in learning more about the Navaho way of life. He knew that their hogans were said to be fairly comfortable on hot days as well as on cold nights. "Alvin, how does your family keep the hogan warm at night?" he asked. The boy explained that every hogan had a fireplace in the center. It burned wood or coal. But sometimes his hogan got cold at night, he added, when his family couldn't afford to buy enough fuel. Many other Indians had the same problem because wood and coal were expensive. ➔



Top: Alvin tests the dirt that will be used to make bricks. He picks up a handful and squeezes it. If the dirt holds its shape when he opens his hand, it is just right for brick making.

Above: These Navaho builders are making bricks with a machine called a Cinva Ram. They put a mixture of dirt and cement into the machine. When they push down on a lever, out comes a brick.

Left: Alvin Nez cooks hot dogs on this solar cooker. After seeing that the sun could cook food, Alvin and his friends were convinced that it could also heat a hogan.



Right: After the bricks are made, the boys put rows of them on sheets of plastic. Then the bricks must sit in the sun to harden for a week.



A Hot Idea

Mr. Birkey started thinking about how people could keep a hogan warm without burning wood or coal. He wanted to find a kind of energy that was cheap and widely available in the desert. He looked around and saw that what the desert always had was sunshine. "That's it," he said to himself. "We'll build a hogan that can be heated by the sun."

The idea wasn't as strange as you might think. Solar energy—energy from the sun—is used to heat a growing number of American homes all across the country today. But solar energy had never been used to heat a hogan before.

Mr. Birkey wanted to see if his idea could work. So he asked Alvin to help build a brand-new kind of hogan. The school principal agreed to let Alvin and 12 other Navaho students work on the project instead of going to their regular classes.

Alvin and his friends decided to use many of the old Navaho ideas in building their new kind of hogan. They would put the door on the east side of the hogan to face the rising sun. There, it would be protected from the hot southern sun in summer and the cold western winds in winter.

Heat Without Fire

Mr. Birkey explained to the boys how this hogan was to be heated without using a fire. "We'll build a very thick wall and put it on the south side of the hogan," he explained. "It's called a Trombe (TROM) Wall, after the person who invented it."

This thick wall would be the hogan's solar heater. During the day, the brick wall would absorb heat from the sunshine. After the sun went

down, the bricks would give off the heat very slowly and warm the air in front of them.

The warm air would rise through a hole at the top of the wall and enter the hogan. As the air cooled off, it would sink to the floor. Then it would flow through special passages under the floor. In turn, these passages would lead back to the wall where the air would be heated all over again. The best feature of this solar heater was that it could be used all year round. In summer, it would work like a cooler instead of a heater because the wall would stay cooler than the air around it.

Mr. Birkey explained that the Trombe Wall was called a passive solar heating system. "There are no fans or motors," he said. "The Trombe Wall does all the work."

Alvin and his friends got very excited about the new hogan. It would combine the best of the old Navaho ideas and the new solar ideas. If it worked, their families and friends one day might have a cheaper, new way to heat their hogans.

The boys decided to do all the work they could by themselves. They even made their own bricks from the earth outside the school, using a machine called a Cinva Ram. To make bricks, they mixed one shovelful of cement with 19 shovelfuls of dirt. And not just any dirt would do, either. It had to be the right mixture of sand, mud and clay, or else the bricks would crumble. Alvin learned to test the dirt by squeezing it in his hand. If it would stay in a ball when he opened his hand, it was just right.

One boy shoveled the dirt into a box on the brick-making machine. Then another closed the

box and pressed a lever. The machine squeezed tightly. When the boy let go of the lever, out popped a new brick. Then another boy took that brick and set it down on a sheet of plastic. There it sat in the sun for a week to cure, or harden. The boys kept repeating this work until they had made 5,000 bricks.

The Walls Go Up

Alvin and the crew dug the foundation for the hogan next and began to build the walls. Each boy became an expert at a job. One was good at mixing the mortar that held the bricks together. Another boy could lay bricks in very straight lines. Alvin was a good leader so he became the foreman. His job was to see that each day's work was done carefully.

When the new hogan was finished, Mr. Birkey, Alvin and the boys were pleased with it. It stayed



Above: After making 5,000 bricks, the boys are ready to begin putting up the solar hogan. Here, they're smoothing out the cement foundation.



Left: At last the brick walls for the hogan are ready to be raised. One of the boys lays the bricks in a straight line. Then he spreads a cement mixture to hold the bricks together.

Below: This honeycombed wall is the hogan's solar heater. It faces south to collect as much sunshine as possible. The roof beams show why a hogan is called "sun ray house" in the Navaho language.

warm in winter and cool in summer. As long as the sun shone a little each day, the Trombe Wall kept the temperature in the hogan around 65 degrees (18°C), no matter how hot or cold it was outside.

Many people came to see the hogan. Some Navahos began asking the boys to help them use the sun to heat their own hogans. The boys felt that their model hogan was serving its purpose. It was showing people a way they could use the sunshine as fuel.

Alvin liked to show the visitors around the hogan. "We used dirt from the earth to make the bricks," he told them. "And we used sun from the sky to make heat. Our hogan is the best of the old and the new."



Factoids



A bee can carry more than 300 times its own weight.

The Mackinac Bridge in Michigan is the world's longest suspension bridge. It stretches five miles.

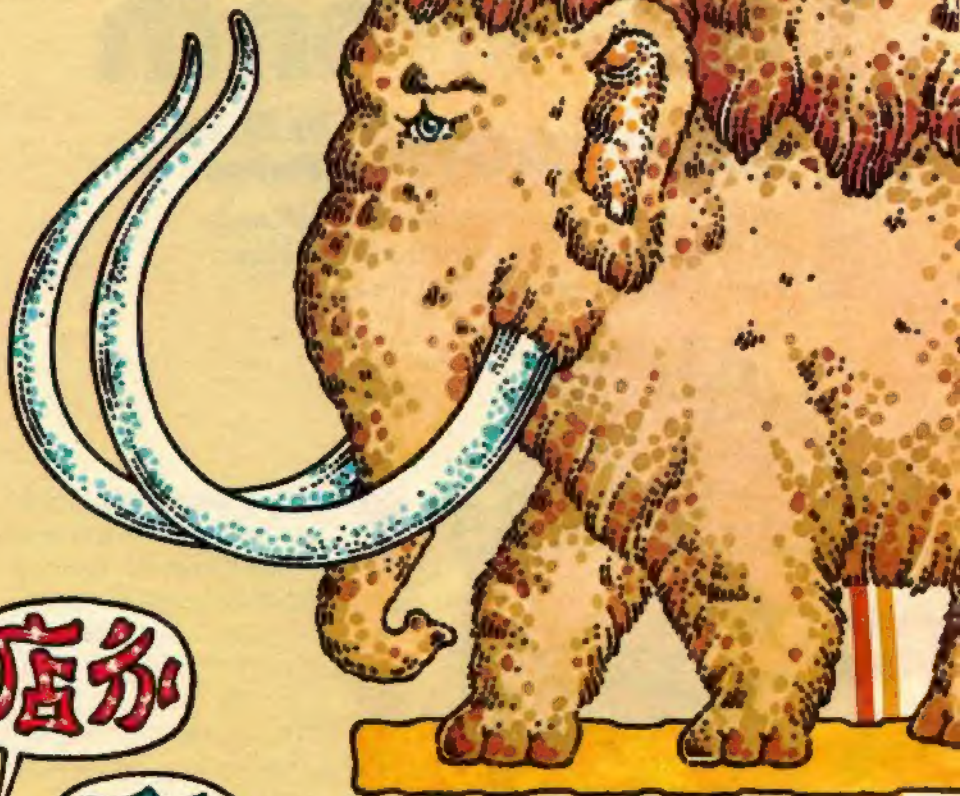


The largest meteor shower on record occurred in 1833, when 10,000 shooting stars were seen in one hour.



An average-sized thundercloud holds about six trillion raindrops.

The ancient mammoth had tusks that were 14 feet long. That's as long as the animal was tall!



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公屠

About 3,000 different languages are spoken around the world.



Animal skin and bones, fish and milk can all be used to make glue.

List of the Month

Hot Spots? by Renée Skelton

What's so hot about deserts? That depends on which desert you're talking about. Here's a quick look at eight different deserts.

One Hump or Two? You've probably seen camels with one hump. But in Asia's Gobi Desert, there are camels with two humps. In summer, the Gobi is a hot desert. But in winter, temperatures often fall below freezing. One-hump camels couldn't stand that kind of cold. But two-hump camels have longer fur and more compact bodies. They are perfect for the Gobi's cold desert climate.



Desert Diamonds Would you believe there is a beach where diamonds are dug out of the sand? It's in Africa's Namib Desert. Millions of years ago, diamonds were left in the sand by a nearby river. About 100 years ago, a man walking on the beach spotted one. Since then thousands of workers have come to the beach to dig for treasure. As many as 4,000 diamonds have been found in just one day!



Ancient Builders There's a mystery tucked away in the cliffs of the American desert. In the steep cliff walls are ancient stone apartment houses many stories tall. They are all that's left of the Anasazi Indians.

The Anasazi built their cliff houses almost 1,000 years ago. Then, they mysteriously abandoned them. No one knows exactly why, or what happened to these ancient builders.



Frozen Desert You won't find camels in this desert. But you might find reindeer, walruses and polar bears! This frozen desert is the land that borders the Arctic Ocean. Just as in other deserts, it hardly ever rains or snows here. The cold air can't hold much moisture. In winter, temperatures stay below freezing. In summer, it might get to be as warm as 50°F (10°C). In this desert, that's a real heat wave!



Home Down Under People in the mining town of Coober Pedy know how to keep cool in the Australian desert. They go underground—and not just to mine. Temperatures in the Australian desert reach over 100°F (38°C) in summer. But underground, it's a lot cooler. Many people have dug holes in the ground or in the sides of hills for their homes. Some people even have two-floor homes underground.



Diggest Desert The largest desert on earth is Africa's Sahara. This brown, empty wasteland is 3,000 miles (4,800 km) long and 1,000 miles (1,600 km) wide. That is almost the size of the whole United States!

The Sahara is still growing. As land south of the area dries up, it becomes part of the desert. In fact, the Sahara has spread 125 miles (201 km) farther south in just the last 25 years!



Dake and Shake If you're ever in the Soviet Union's Karakum Desert, take a fan and a blanket. Temperatures can reach a scorching 120°F (49°C) in the daytime, then drop to a chilly 40°F (4°C) at night. So, the people of the Karakum dress to keep cool when it's hot and warm when it's cold. Many wear black fur hats, long, loose cotton clothing and goatskin boots. How's that for desert fashion!



Driest Desert All deserts are dry. But Chile's Atacama may be the driest. During your lifetime, it will only rain there three or four times! Because of the dry climate, the plants there have clever ways to get moisture. Some plant roots go deep underground for water. Other plants find water in the air. The Atacama is often foggy. The plants get the water they need right from the fog!



Oasis

In this game, you will travel from one town to another across a hot, dry desert. The winner is the person who makes it with enough water to FINISH.

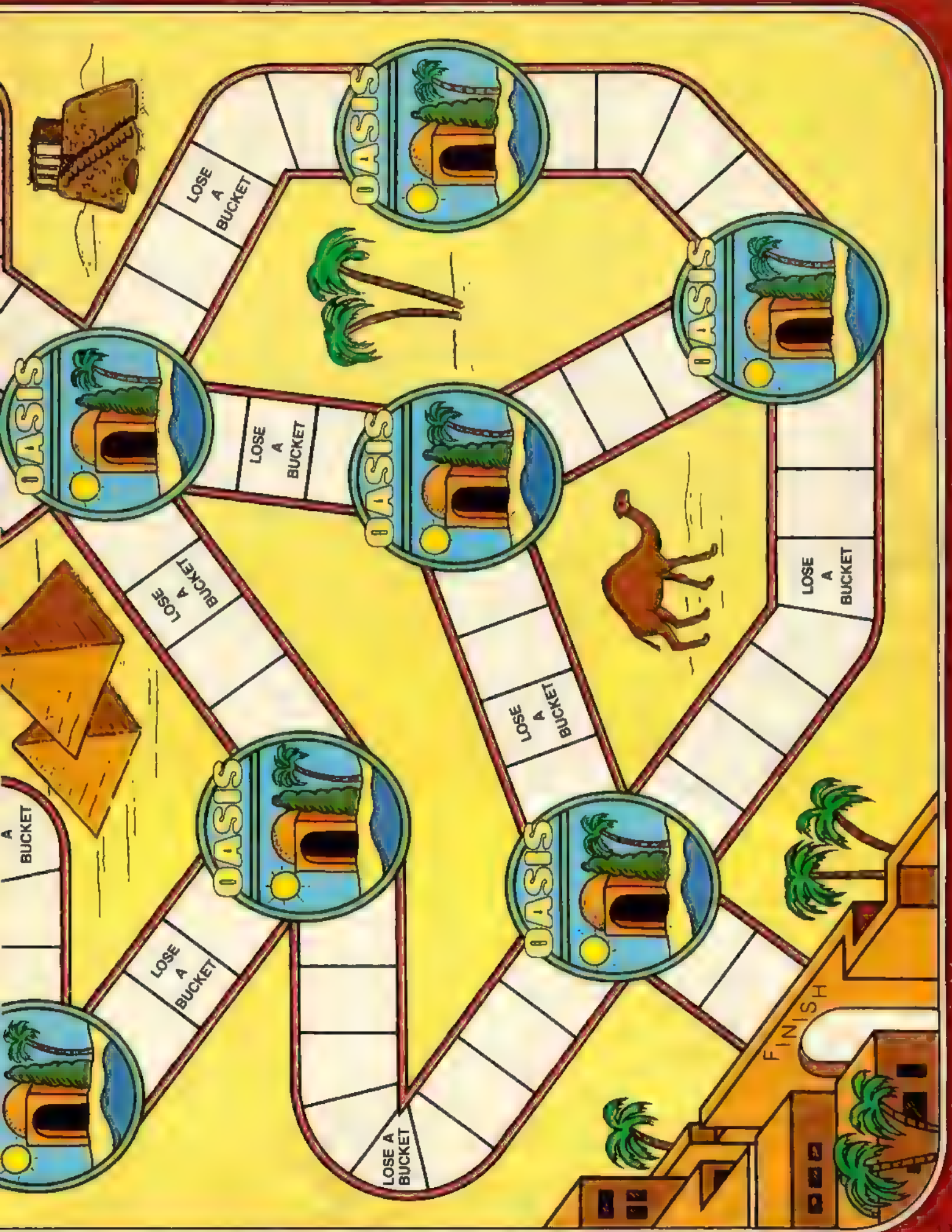
Setting Up the Board

1. Cut out the water buckets on page 27
2. If two people are playing, put two buckets on each oasis. If three people are playing, put three buckets on each oasis, and so on.

How to Play

1. Each player uses one coin as a playing piece.
2. Roll one of two dice to move around the board.
3. When you pass an oasis, take a bucket of water from it.
4. When you land on LOSE A BUCKET, put one of your buckets back on any oasis.
5. The first player with at least 8 buckets to land exactly on FINISH is the winner.





DESERT SURVIVORS

PLANTS AND ANIMALS OF THE AMERICAN SOUTHWEST

by Patricia Haddock



Imagine that you're going for a walk in the desert in the Southwest. It's vacation time, and you're all set to enjoy seeing beautiful colored rocks. But then hot winds start to whip your face with dirt. There are few trees to shade you from the bright sun. Above the distant rocks, the air shimmers in heat waves. Sweat drips down your face. All you can think about is getting a drink. But there is no water. Then the sun goes down. Now you begin to shiver as the temperature drops below freezing.

For a temporary visitor like you, life in the desert is hard. Imagine how tough it is for all the animals and plants which live there.

This area in the southwestern part of our country is one of the world's major deserts. It covers most of Arizona and Nevada and parts of other states. These wide open spaces look pretty empty. But many living creatures make their homes there. They have special

Above: Saguaro cactuses are the largest plants found in the American desert.

ways to adapt themselves to this harsh, dry world. Some of their survival tricks are amazing.

Finding enough water is one big problem that all living things face in the desert. The place has little rain or snow. Desert animals have to get their water from their food. In fact, some like the kangaroo rat never take a drink in their entire lives. Plants also need water to live. And since they can't roam around to find it like animals do, they must find ways to store what they get. Cactus plants, for example, store water in their fleshy stems.

And if water isn't enough of a problem, desert animals and plants have to face both hot days and cold nights. That's enough to drive you right into the ground—which is exactly where some animals go.

They dig holes in the earth, where they are safe from changing temperatures.

As you read the rest of this story, you will find out how some plants and animals survive in the American desert. For them, this hot, dry, rocky land is the perfect place to live.

Prickly Plants

Have you ever touched a cactus? If so, you probably got a finger full of stickers. They're called spines. Cactuses have spines instead of leaves. They don't let the plant's water evaporate into the air as leaves do. Spines help cactuses in other ways, too. These sharp points keep them safe from plant-eating animals. The spines also cast shadows on the stem of the plant. With hundreds of spines casting shadows, a large part of each cactus is shaded from the sun.

There are over 1,000 kinds of cactuses in the American desert. But the king of them all is the saguaro (su-HWAR-oh). It grows to be about 50 feet (15 m) tall. This cactus can hold up to 10 tons of water. The trunk has many folds in it. As the plant fills up with water in the rainy season, its folds spread out. The water stored in the folds is used slowly during dry spells. The saguaro sometimes has to wait several years before it rains again.

Stinging Scorpion

One thing the desert has plenty of is insects. They do well in the desert because there is plenty of food for them. They feed on the flowers that desert plants produce in the spring. All these insects are good news for the scorpion. This fierce relative of the spider feeds mainly on insects.

The scorpion hunts at night, like many other desert animals. It crawls out of a hole in the ground or ➡➡

Below: People and animals sometimes break into one of these barrel cactus plants to steal its water.



Above: This scorpion is hard for its enemies to see because its color blends in with the sand.
Left: Like many other desert plants, the barrel cactus grows bright blossoms in the spring.



Left: You wouldn't want to get too close to this Gila monster. It is the only poisonous American lizard.

from under a rock. The animal grabs its prey with its claws. Then it uses the poison stinger in its tail to kill its victim.

Lurking Lizards

Snakes and lizards are reptiles that live in the desert. Reptiles have special problems with the desert's hot days and cold nights. Their body temperatures go up or down to match the temperature of the surrounding air. So if a snake or lizard isn't careful, its blood could overheat in the sunshine or freeze at night. The answer to this problem is to stay on the move. In hot weather, reptiles crawl into the shade or a hole in the ground to keep cool. But on cool days, they creep into the sunshine to warm up.

The Gila (HEE-luh) monster is the only poisonous lizard found in the United States. It makes its home in a burrow in the ground. Sometimes it even tosses out the animal that dug the hole in the first place! If you had a poisonous bite like this creature, you could get away with being pushy, too. Once it bites a victim with its sharp teeth, a Gila hangs on like a bulldog. The poison is stored in its lower jaw and slowly spreads into the victim.

Slithering Snakes

At least 12 different kinds of rattlesnakes live in

Above right: There are a dozen different kinds of rattlesnakes living in the desert.

Right: This snake is called sidewinder because of the way it travels, leaving J-shaped marks in the sand.





Jumping Jackrabbits

What's the first thing you'd notice if you saw a jackrabbit? Its giant ears! These eight-inch (20 cm) ears help the animal hear very well. And that's important. Coyotes, eagles and other animals are always eager to gobble up a juicy jackrabbit. So this animal must stay alert. It can even move each ear separately in order to hear better.

These big ears also help the jackrabbit to keep cool. A huge network of blood vessels runs through the ears. When the animal gets hot, blood pumps through these vessels, releasing body heat into the air. Soon the jackrabbit feels cooler.

It's incredible how so many animals and plants have learned to cope with life in the tough world of the American desert. There are almost as many ways of surviving as there are plants and animals. Because these survival tricks work well, the desert is never "deserted." It is always full of life.

Left: Many desert birds like this elf owl make their homes in burrows in the ground.

our western desert. One of the most interesting is the sidewinder. It is named for the way it moves. First, this rattler forms its two-foot (.6 m) body into an "S" shape. Then it pushes one half of the S forward while the other half remains still. This lets the snake travel easily over deep sand. Surprisingly, the marks it leaves in the sand are shaped like a J instead of an S.

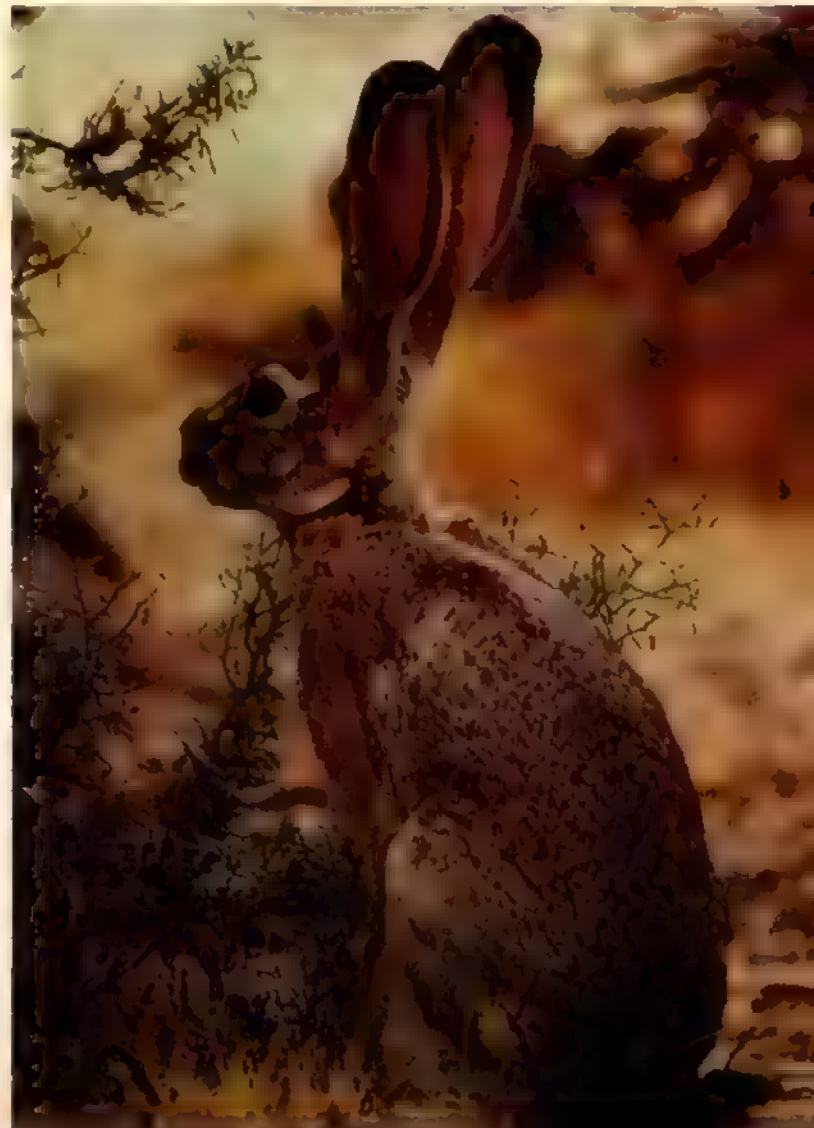
This rattler has a special talent that it shares with other desert animals which hunt at night. It can sense an animal's body heat. The snake's heat sense comes from special holes, or pits, between its eyes and nostrils. This heat sense is so finely tuned that the snake can spot a temperature change of less than one degree from 18 inches (46 cm) away. The pits in its face give the snake the name pit viper.

Odd Owls

You might see this small brown owl perched on the edge of a hole. But it would be a hole in the ground, not a hole in a tree. Like many desert birds, this owl makes its home in a burrow in the ground. The burrow keeps the bird safe from the sun. When the desert floor is hot enough to blister your feet, the owl's burrow may be 60°F (15°C) cooler.

Other birds use a trick much like this. They build their homes in saguaro cactuses. The insides of the big plants are much cooler than the desert air outside.

Right: A jackrabbit's extra-large ears help it to cool off in the desert heat.



Any Questions?

How does a light bulb burn

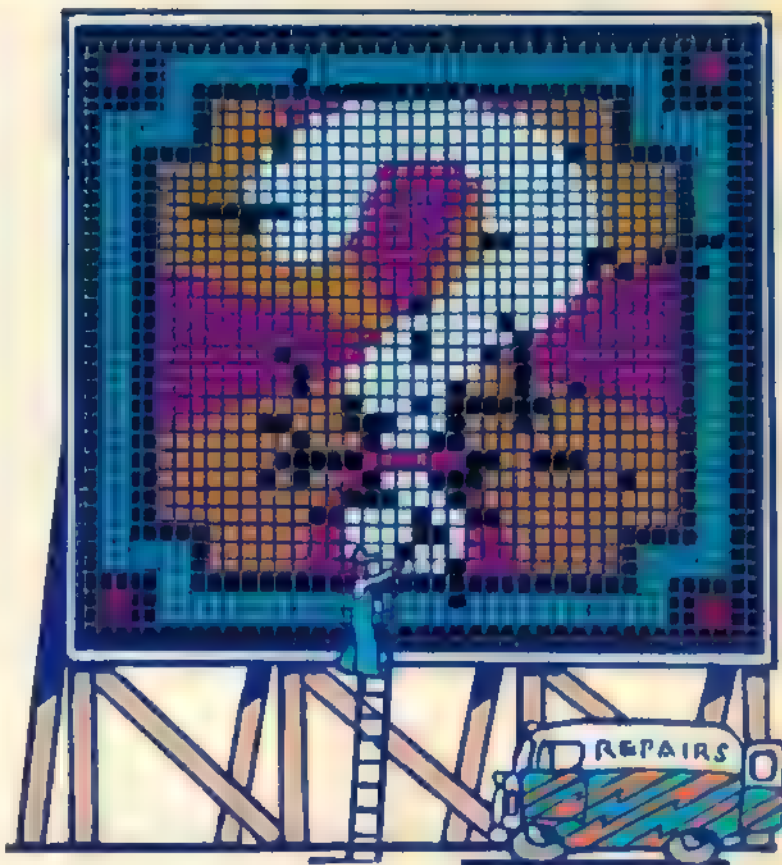
out? Once in a while, you turn on a light and the bulb goes *phfft!* It burns out. Look closely to see what happened.

The thin wire, or *filament*, that sticks up in the middle of the bulb has broken. This filament is the most important part of the light bulb. When you turn a switch, electricity flows through this wire and makes it very hot. The glowing wire gives off light.

If the bulb contained air, the hot filament would burn up. But it doesn't contain air. It is filled with other gases instead. That makes it possible for the filament to glow without bursting into flame.

A light bulb filament usually lasts a long time. But no bulb lasts forever. Tiny pieces of the filament evaporate as it is heated over and over again. The evaporated metal begins to cover the inside of the bulb, turning it gray. The wire itself gets thinner and thinner. Finally, it breaks—leaving you in the dark!

Question sent in by Donny Otvos, Hayward, CA.



Why do your knuckles crack?

When you bend your knees or fingers, sometimes you hear a *crack*. This strange noise is nothing to worry about. In fact, some people even like the funny little *pop*. They get into a regular habit of cracking their knuckles.

The finger bones themselves don't make the noise. What makes the crack is the space between them—the knuckle joint. Inside your knuckles and other joints are small spaces filled with fluid.

When the bones in your fingers move apart, the fluid in the joints is less tightly pressed together. Bubbles quickly form within the fluid. The sudden creation of these bubbles sends out sound waves. And that's what causes the cracking noise.

Have you ever noticed that people who crack their knuckles can't do it again right away? They must wait a few minutes. But soon the gas in the bubbles gets absorbed back into the fluid. Then they're ready to make another crack!

Question sent in by Stacy Butrovich, Stony Brook, NY.

Do you have a question that no one seems able to answer? Why not ask us? Send your question, along with your name, address, and age, to:

Any Questions?
3-2-1 CONTACT
P.O. Box 599
Ridgefield, NJ 07657

How does popcorn pop? According to an American Indian legend, the pop in popcorn came from a demon hidden inside. Whenever the corn was heated over a fire, the demon got mad. As the corn got hotter, he would blow his top. Pow! The popcorn exploded, and the tiny demon was gone!

The real secret of what makes popcorn pop is water. Without water, your popcorn would just sit there, instead of popping all over the place. There is water in the center of every kernel of corn. It is hidden within a tiny blob of soft starch. When you heat the corn, the water gets hot, too. Heat causes things to expand, or spread out. The heated water turns to water vapor and expands outward very quickly. It blasts open the kernel of corn.

All that's left is the blob of starch. It gets stretched as the kernel blows open. Soon it hardens with some air inside. Now you've got a puffy, fluffy bit of popcorn. Pass the salt!

Question sent in by Lar Nihinen Key, Killington, VT.



How many kinds of gorillas are there and where do they live?

Unless you count the make-believe King Kong type, there is only one kind of gorilla. It lives in the rain forests of central Africa.

Your basic gorilla goes by two names. In the east African mountains, it is known as—what else?—the *mountain gorilla*. Where the land flattens out in west Africa, it is called the *lowland gorilla*.

Lowland gorillas are usually a bit smaller, but all gorillas are big apes. They may weigh up to 450 pounds (200 kg) and stand up to 6 feet (1.8 m) tall. Big as they are, however, you would have trouble spotting a gorilla if you went on safari in Africa. These fierce-looking animals are really very shy. At the sound of your voice, they would run and hide.

Like many African animals, gorillas are in danger of disappearing forever. There are less than 2,200 left. But now, thanks to careful breeding in zoos, these animals are beginning to make a comeback.

Question sent in by Justin Foltermann, Baldwinsville, NY.



21 CONTACT

POSTER





Contact Report

A Frog in Her Throat? You know that kangaroos carry their babies around in pouches. But that kind of pocket is outside the mother's body. Now a kind of Australian frog has been found that swallows her own eggs and carries her babies inside her stomach.

Like birds, little frogs are hatched from eggs. The mother frog usually lays her eggs underwater in a kind of jelly ball. The jelly floats on the surface of the water and protects the eggs until they're ready to hatch.

But this Australian frog lays her eggs and then swallows them! Scientists say that the eggs are not digested as food. Instead, they grow from tadpoles into little frogs. As they get bigger, the young frogs start to squirm inside their mother.

And that's not the end of this weird story. When the frogs are finally ready to be born, they climb up Mom's throat and jump out of her mouth. Yuck!

—Written by Suzanne Martinucci



Baby frogs are born from this mother frog's mouth.



Cotton grows in several colors other than white.

Colorful Cotton Your T-shirts don't start out red or blue. The white cotton they're made from gets its color from being dyed. But now some cotton that is naturally colored has been found.

James Vreeland is a college student from Texas. He found this colored cotton growing in Peru, a South American country. The cotton there is beige, brown, gray and purple, he reports.

You may think colored cotton sounds like a modern idea. But it has been around for a long time. Early Spanish explorers in Peru saw huge fields of the colored stuff growing there. They were very surprised. All the cotton they had ever seen was white.

Today, plant scientists think the colored cotton is one of the oldest kinds of cotton in the world. It may have first been grown more than 4,500 years ago. Amazing!

—Written by Cheryl M. Halton

Contact Report

Hi, I'm Hoover! When you go to the zoo, you may like to talk to the caged animals there. But you don't expect them to talk back, do you? Well, a ten-year-old harbor seal named Hoover has been doing just that!

Hoover lives at the New England Aquarium. The staff there says that Hoover has been making noises for most of his life. But during the last five years, with coaching, his noises have started to sound a little like human speech. He can "say" his name, ask "How are you?" and even laugh.

Researchers have been studying Hoover and making tapes of his words. Since no one has ever heard a talking seal before, they hope to find out how Hoover is able to make these sounds.

Of course, just because a seal can imitate people's speech doesn't mean it knows what it is saying. Still, what would you answer if a seal swam up to you and said, "How are you?"

—Written by Suzanne Martinucci

A story on Hoover was sent in by Veronica Sevcik, West Boxford, MA.



Can this harbor seal talk? Some people think so.

Tricky Teeth You may have heard of foldaway tables and foldaway beds, but how about foldaway teeth? That's right, says scientist Alan Savitzky. He has found six different kinds of snakes which have foldaway teeth. These teeth can fold because they're attached to the snake's mouth by hinges of skin.

Savitzky thinks these snakes have folding teeth so they can eat animals with hard bodies. For example, lizards are a favorite snake food. Lizards are often covered with stiff, bony scales. When a snake swallows a lizard, its teeth fold down so the animal can slip into the snake's stomach. But if the lizard starts to struggle, these teeth come back up. They're like a one-way gate. Whatever goes in can't get back out!

—Written by Suzanne Martinucci

What's That? Have you seen a story in a newspaper or magazine that belongs in the Contact Report? Why not cut it out and send it to us? Be sure to include your name, age, address and the place you found the story. Send it to: **The Contact Report**

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Some snake teeth fold away until they're needed.

The Bloodhound Gang



The Case of the Whispering Pirate

Part Two

by Madeline Sunshine

Last month, the Bloodhound Gang answered a call for help from a man at a recording studio. Someone was stealing his company's tapes and using them to make illegal record albums. While investigating, the Gang got locked in a tiny soundproof booth. No one was due in the studio till the next day. By then, the air in the booth would be long gone!

Almost twenty minutes had passed since the Bloodhound Gang had been locked inside Sound Appeal's soundproof booth. Their friend Tom Kellogg, owner of the studio, was locked inside with them. As each second ticked by, the booth grew hotter, stuffier and more unbearable.

"If there were only some way we could make ourselves heard," said Ricardo.

"Forget it," said Zack. "Sound waves can't break through a soundproof booth."

"Then what if we tried breaking down the door?" suggested Vikki.

"I'm afraid that would be impossible, too," Tom replied. "The padlock holding it shut is made of

heavy-duty steel. We lock the most expensive amplifiers in here at night, so we had to get something really strong."

"Well, I'm not ready to give up," said Ricardo. "There's got to be a way out of here; there's just got to be!"

For all Ricardo's hopefulness, they were still no closer to finding a way out. All of a sudden, they saw the lights go on in the control room.

"Hey, that's Stacy, Mathew and David, three of my engineers," Tom cried excitedly.

He, Vikki, Ricardo and Zack stared at the engineers hopefully. A few seconds went by. Then, at last, the studio lights went on as Stacy, David and Mathew hurried inside and began to unlock the padlocked booth.

"Boy, is it good to see you," sighed Vikki, as she and the others filed outside. "We thought we'd never get out of there."

"Yes," said Tom. "No one was scheduled to actually use this studio until tomorrow."

"We knew that," said Stacy. "In fact, that's why we came in to check things out."

"Yeah," Mathew agreed. "We were walking down the corridor, when we noticed that the red light outside this studio was lit up. With no one booked to work here, that seemed pretty strange."

"The fact that the studio lights were off made it even stranger," David put in. "We couldn't imagine who'd be recording in the dark. So, we had to come in and find out."

"Oh, and listen Tom," Mathew added, "we found one of the tape recorders running. Obviously that's why the red light was on."

"Whew!" said Tom. "What a stroke of luck. One of us must have accidentally leaned on the record button while we were in the control room."

The Suspects Get Curious

"But wait a minute," interrupted Stacy. "What happened to you? How did you get locked in?"

"Well," said Tom, "I'm afraid that someone here has been—"

"Uh, playing a practical joke," Zack broke in. "Isn't that right, Tom?" he said, staring at the man intently. "Isn't that what you told us?"

"Uh, yes," said Tom, catching on. "I can't think of why else someone would lock us in a booth."

"Well, it doesn't really matter now," Vikki piped in. "We're all out, and we're all okay."

The three engineers exchanged a puzzled glance. "Well, we have recording sessions in Studios A and C, so if you'll excuse us," David began.

"Sure," said Tom. "Go on. Uh, by the way, where's Louis?"

"He must still be out to lunch," Stacy offered, as she and the other two engineers headed off to Studios A and C.

As soon as they were gone, Zack ran over to the tape cabinet. "Quick!" he said to Tom. "The keys!"

In a flash, Tom had the cabinet opened.

"Just as I suspected," said Zack. "Eleven tapes! When I counted before, there were 12."

"That means the person who locked us in must have taken one," said Vikki.

"It also means he or she must have had a key to the cabinet," said Ricardo. "As you can see, the lock looks fine—it hasn't been jimmied or broken."

"Right," said Zack. "That's why I stopped Tom from telling those engineers the whole story. See, if this is an inside job—and I'm sure it is—Stacy, Mathew and David are prime suspects!"

"So is Louis," said Vikki. "Don't forget, he has a key to the cabinet, too. We'd better talk to all the engineers right away."

After relocking the tape cabinet, Tom and the Bloodhound Gang went back into the control room. There, they questioned all four of the engineers. Each was told that Tom was angry about the practical joke and wanted to know who was responsible for it. They were asked to account for the last hour and a half of their time. They all seemed to have alibis for most of the time. But surprisingly, not one of them could prove where he or she was during the few minutes it took to lock the soundproof booth and steal the master tape.

"I'm afraid we're no closer to zeroing in on the pirate than we were before," Vikki said sadly. "We're still left with four suspects."

A Possible Clue

"Yes," said Tom. "And a whole reel of used-up tape." He pointed to the tape recorder that had accidentally been turned on. "I had set this up for tomorrow's session," he explained. "Now I'll have to erase whatever was recorded."

"Wait!" said Zack. "Don't erase anything. Was that tape connected to a live mike in the studio?"

"Yes," replied Tom. "It was connected to the piano mike."

"Which is pretty close to the tape cabinet," Ricardo said excitedly. "Do you think it could have. . . ?"

"Well, there's only one way to find out," said Tom. "Let's rewind the tape and see what we've got." He rolled the tape back to the beginning. Then he pushed the playback button. Everyone gathered around the control board to listen.

"Hey, how come the walls in here are all carpeted?" they heard. It was Ricardo's voice. Next came Tom's, then Vikki's, then Zack's and then Ricardo's again. As they continued listening, Zack noticed an interesting-looking electrical gadget built into the control board.

"What's that?" he asked Tom. "What do those wavy lines going across the green screen mean?"

"That instrument's called an *oscilloscope*," said Tom. "The wavy lines moving from left to right are electrical signals. They represent sound waves. You know what sound waves are, don't you?"

"As a matter of fact, we do," Vikki said, flashing a smile at Zack.

"Good," said Tom. "Then I'll go on. We use the oscilloscope during the mixing process. For example, we can look at a picture of the sound each instrument makes. Then we can tell if the instrument's playing sharp or flat or 'just right.' Now we're looking at electrical pictures of your voices. See? Zack's speaking on the tape. So, the wavy lines you're looking at represent the sound waves his voice is making."

"Whew! That's something! But what makes it all work?" asked Zack.

"Well, the microphone converts sound waves into electrical signals," Tom began. "The control board feeds these signals into the oscilloscope, which displays them on the screen in the form of waves."

"But how come the waves keep changing in height and length?" Ricardo asked.

Tom Explains

"Good question," said Tom. He pushed a button on the oscilloscope and a series of wavy lines were frozen on the screen. "The tallness or height of the wave is called the *amplitude*. The louder the sound, the higher the amplitude. So, if you shouted into the mike, the wave that showed up would be a tall one. If you spoke softly," he went on, "or if you were standing far away from the microphone, the waves would be shorter in height."

"The distance between two waves is called a *wavelength*. The closer the waves are to each other, the higher the sound's pitch; the farther apart they are, the lower the pitch. A bass drum, for instance, has a low pitch; a flute has a high pitch. So, the wavelength of a bass drum would be much longer than the wavelength of a flute. Why don't I put the tape back on?" he suggested. "There's a little more for us to listen to before we get to the end."

Tom pressed a button, and the tape started rolling again. But after a minute or two, the tape went silent.

"Hey, what's all this quiet about?" said Ricardo.

"Shush!" cried Vikki. "Did you hear that? It sounded like a door slamming."

"Yeah," Zack chimed in. "This must be when we got locked into the booth."

"What an eerie feeling," whispered Tom. "We're actually listening to the pirate at work."

"Too bad this isn't video tape," said Vikki. "I'd like to have the pirate caught already. Locking us

in that soundproof booth was no joke. Who knows what a person like that will do next!"

Just then, they thought they heard a voice on the tape. Tom rolled the recorder back to the same spot again. "Drat! The key. . . ." they heard a voice whisper. "It's got to be here somewhere." A few seconds later, they heard the tape cabinet squeak open and then shut again. Finally, they heard a door slam. Then the tape went dead.

"That was unbelievable!" said Vikki. "Do you realize we have the voice of the pirate on tape!"

"Too bad it's too low to recognize," said Tom. "It could be any one of my four engineers."

"Any of three," said Zack. "I've already eliminated one suspect and," he added triumphantly, "I think I know how to eliminate two more."

The others looked at him questioningly. But, Zack never had time to explain. Suddenly, the control room door burst open, and two men with scraggly beards pushed their way into the room.

"Okay, up against the wall," shouted one of them. "Move—all of you!"

"You'd better do what he says," growled the other man. "My friend means business!"

Tom looked at the intruders in shock. He was just about to say something when he heard Zack whisper, "Careful, everybody. Those guys have guns under their jackets!"

What do these armed men want with Tom and the Bloodhound Gang?

To find out, read the exciting conclusion of "The Case of the Whispering Pirate" in next month's 3-2-1 CONTACT!





Dolt!

Desert Animal Hunt

The names of 15 different desert animals are hiding here. They are across, up and down and diagonal. Good luck!

CACTUS WREN	PECCARY
CAMEL	QUAIL
COYOTE	RATTLESNAKE
ELF OWL	ROADRUNNER
JACKRABBIT	TOAD
KANGAROO RAT	TORTOISE
KATYDID	WOOD RAT
MULE DEER	

Answers on page 37.

K	E	L	F	O	W	L	R	P	T	N
A	A	H	B	D	T	E	E	I	R	E
T	O	N	C	Y	E	C	B	O	A	R
Y	R	E	G	D	C	B	A	Q	T	W
D	L	L	E	A	A	D	E	U	T	S
I	A	L	R	R	R	C	S	A	L	U
D	U	Y	K	U	A	O	I	I	E	T
M	R	C	N	M	E	Y	O	L	S	C
N	A	N	E	D	A	O	T	R	N	A
J	E	L	E	E	L	T	R	U	A	C
R	V	B	E	C	C	E	O	A	K	T
T	A	R	D	O	O	W	T	X	E	X

Game Buckets Cut out these water bucket pieces. Use them with the game on page 12.



Genes

by Phyllis Keaton

This month, *Busy Bodies* takes a close look at your genes. Not the ones that you wear to school every day. The genes we're talking about are found in every tiny cell of your body. They are so small that hundreds of them could fit on the dot of an i.

Genes may be tiny, but they are very important. They carry the basic plan for the way you look. It's your genes that determine whether you have blue or brown eyes, curly or straight hair, thousands of freckles or none at all. Your genes also make sure that you have 10 toes and 10 fingers, but only one nose. One more thing. Genes are the reason that people are born with hair, while birds are born with feathers. And a good thing, too!

Meet Your Genes

They are too small to see, but you can still take a

look at what your genes are all about. To do this, stand in front of a mirror. First try to wiggle your ears. No luck? Well, try to raise one eyebrow, without lifting the other. Can't do that either? Okay then, try to roll your tongue.

All these are examples of *traits*. They are things that people can do only if they have certain genes. If you have the genes for ear wiggling, you can move your ears. If you don't, forget it. No matter how you try, you won't be able to make your ears budge.

Here's another way to "meet your genes." Stand next to your father, mother, brother or sister and look in the mirror again. Notice anything similar? For example, do you have the same eye color, hair color or mouth shape? All gene traits are passed down from parents to children. That doesn't mean you have to look like everyone in your family. But there is a good chance that if you look closely, you will notice at least a few traits that are alike.



dies



Your Personal Blueprint

Long before you have brown eyes or curly hair, your genes are with you. In fact, your genes are with you *before* you are you!

Nine months before birth, all human beings start out as a single cell. Inside this cell are tiny threadlike structures called chromosomes. (KROME-ma-sohms) It is here that the thousands of genes are located. These genes are a kind of blueprint. They contain the basic information needed for that single cell to grow into a person.

This one cell will divide into two. Then the two split into four and the four into eight. This goes on and on. As each new cell forms, it contains a set of chromosomes. After a while, some cells form your skin cells. Others form your heart, eyes, bones—every part of your body. By the time you are born, there are *trillions* of cells. And in the center of every one is your own personal blueprint.

Genes That Show

Every person inherits two genes for each trait. One gene comes from your mother, the other one from your father. But wait a second! What if your mother has red hair and your father has brown? Does that mean half your hair will be brown and half your hair will be red?

Lucky for you, it doesn't. If that were true, the world would be filled with a lot of people with two-toned hair, eyes and skin. If a person has a gene for two different hair colors, one will "cover up" the other. The gene which shows through is called the *dominant* gene. The gene that is covered is called the *recessive* one. So if you have a brown hair gene and a red hair one, your hair will be brown.

Just because your recessive genes are held back doesn't mean they disappear forever. They are still a part of your basic blueprint. If you have brown hair and you marry someone with brown hair, you could still have a baby with red hair. It would mean that each of you passed a recessive red hair gene to your child.

New Genes

Genes hold your past, present and future. Your great-grandmother may have had dimples. Your children's children may have the same kind of dimples. Simple, right? Wrong! Sometimes, for no apparent reason, new traits appear. These traits become part of your genetic blueprint. These changes are called mutations (mew-TAY-shuns). If you have blue eyes and your parents have brown eyes, it could be that two recessive genes got together. It could also mean there was a mutation—a change—of your genes.

Matching Genes

Because everyone inherits different genes from his or her parents, everyone has different traits. But there's one big exception—identical twins. These kinds of twins come from the same original cell, so they carry the same basic blueprint. That's why they look so much more alike than you look like your sister or brother.

But even identical twins are unique. Genes determine many things. But the world around a person—the environment—is important, too.

Scientists have studied genes and environment.

They hope to find out how important a part each plays in deciding what a person is like. One of the best chances to do this came three years ago, thanks to James Lewis and James Springer.

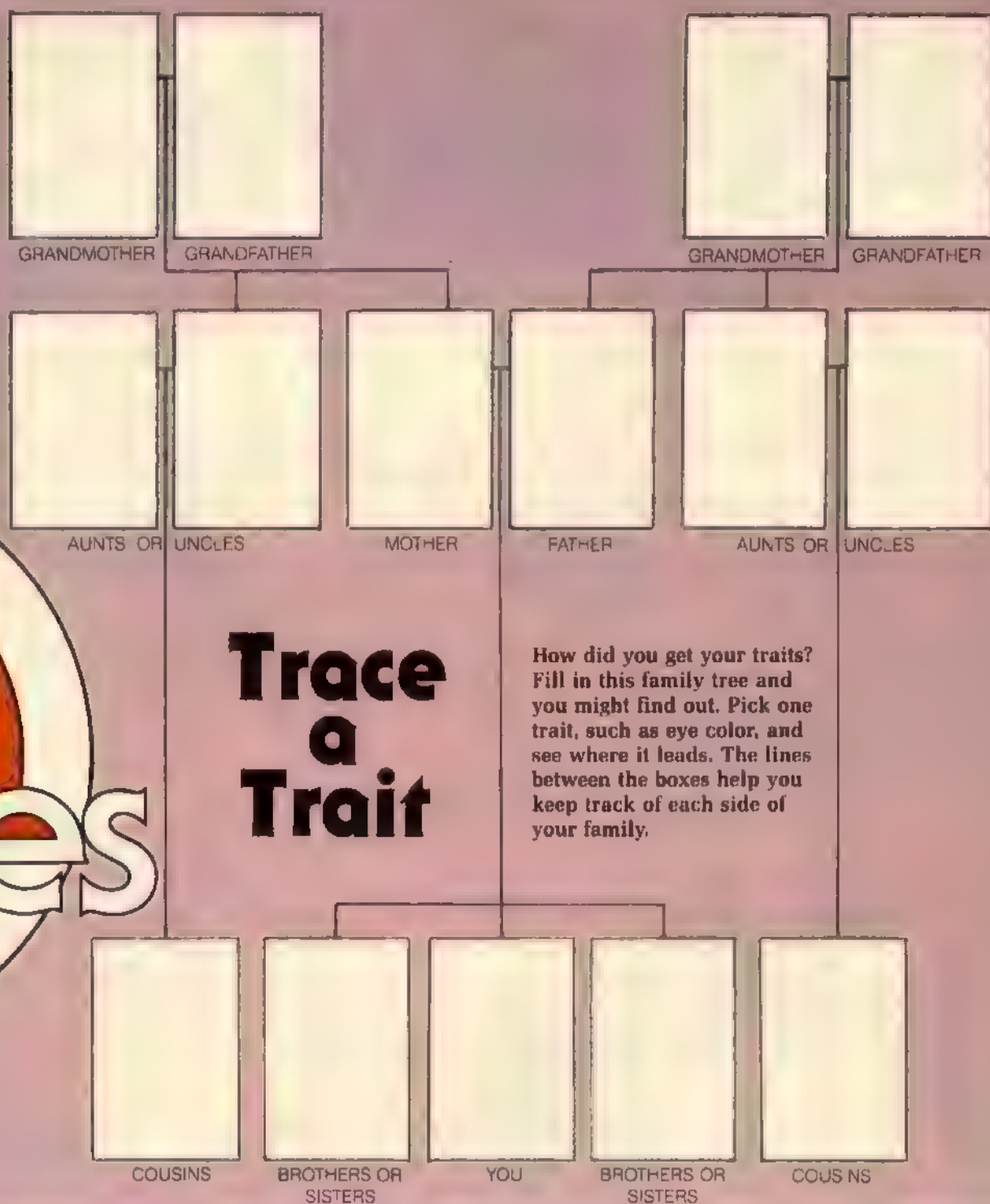
The two Jims were twins who had been separated at birth. They met for the first time when they were 39 years old! The Jims had the same basic blueprint. But they also had grown up in completely different environments. How much alike would they be?

When the two Jims met, they liked each other immediately. They did not feel like strangers, and they soon discovered that they had many things in common. Some of their habits were the same. So were their hobbies.

But the two Jims also are different in many ways. In fact, they are probably more different than twins who were raised together. Clearly, environment is an important part of who you are. How important? No one can say for sure. But the case of Jim and Jim may provide important clues to the answer.

**BUSY
BO**





Your Family Tree

Pick a trait. Any trait. Like blue eyes or brown hair. Chances are that your brother or sister, or one of your cousins, has the same trait. What if you're the only cousin with green eyes? You may find out how you got them by filling in a family tree.

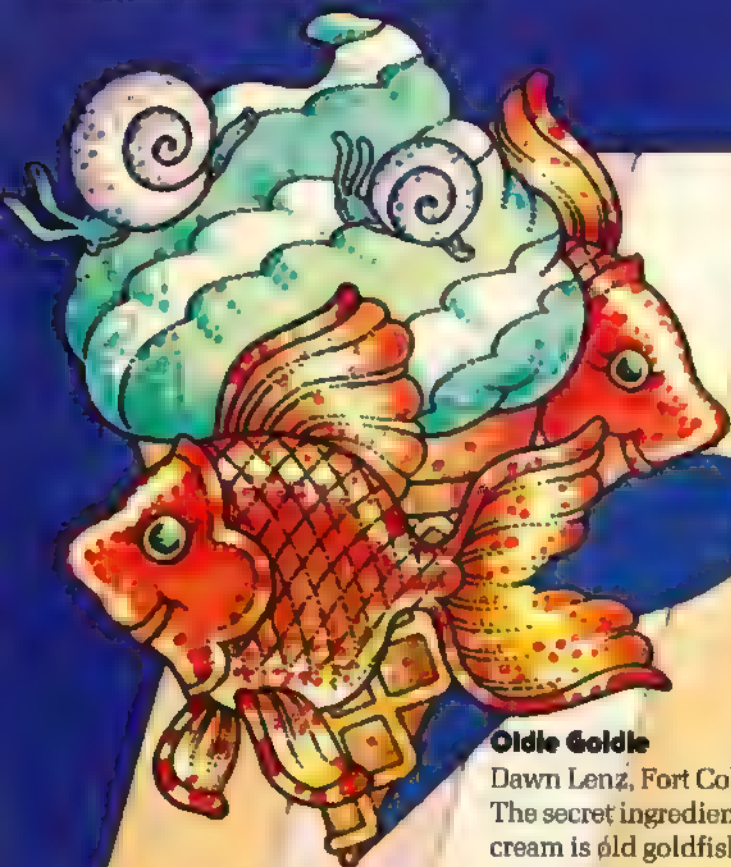
Write your name and the names of your *blood* relatives in the spaces shown. You may have to add some extra spaces.

Now trace a trait. We'll use eye color as an

example. But you can use other traits, if you want. Fill in the eye color of everybody in your family. If you don't know what everyone's eye color is, ask them. Or you can ask your parents or look at snapshots. You can even check old birth certificates. Once you've got the whole tree filled in, look for a pattern. Maybe your parents don't have green eyes like you, but one of your grandparents does. Your genes have their roots in the past!

Contest Winners!

Well, this time you folks did even better than usual. We asked you to send in an idea for the weirdest ice cream flavor you could think of. Not only are your flavors weird, they are really disgusting. Here are our favorites.



Oldie Goldie

Dawn Lenz, Fort Collins, CO
The secret ingredient in this ice cream is old goldfish bowl water. Yuck!



Toothpaste Ice Cream

Zack Phillips, Glendale, AZ
Zack's flavor is perfect for kids who want to eat ice cream after every meal.



Juicy Jumping Jellybean Jubilee

John Smith, Villanova, PA
The jellybeans jump right out of John's ice cream.



Rattlesnake Ripple

Sharon Apotheker, Danbury, CT
You better take a bite of this ice cream fast. It bites back!



Old Gym Shoe Chew

Brook Bolesta, La Verne, CA
You think this is disgusting?
We almost picked one made
out of old sweat socks!



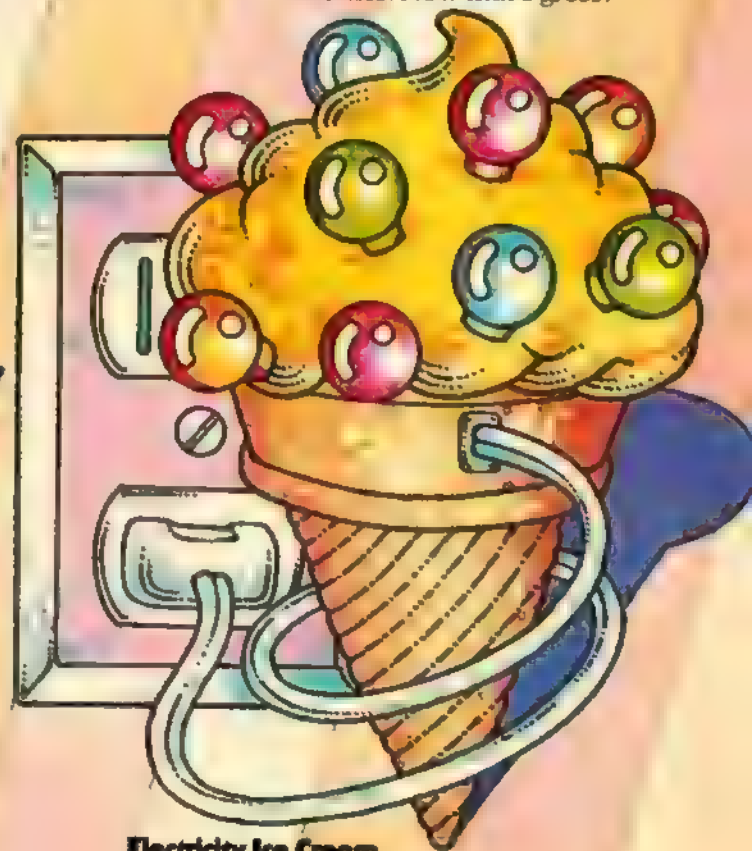
Three Flavor Delight

Almora Gross, Elk, CA
Almora's ice cream is flavored with
asparagus, peanut butter and cat
whiskers. Now that's gross!



Moon Rock Sherbet

Nicole Nazzaro, Bensalem, PA
This is the perfect ice cream for
people who like their munchies
crunchy.



Electricity Ice Cream

Amy Beranek, Bolinbrook, IL
Take a bite of Amy's ice cream, and your
nose lights up. How shocking!



Here are some books to read and things to do and see after reading this issue of 3-2-1 CONTACT.

Indian Books

On page 4 you met some native Americans working on a project in the desert. There are many kinds of Indians all over the United States. Your library or bookstore has books that can show you their many ways of life. Here are a few to look for:

We Have Not Vanished If you think all Indians are in the West, you're wrong. More than 100,000 native Americans still live in the 16 states on the eastern coast of the United States. This book by Alfred Tamarin takes a state-by-state look at the eastern Indians. It's published by Follett Publishing.

The Changing Eskimos This book is about native Americans who live in the northern parts of Alaska, Canada and Greenland—the Eskimos. The climate is cold, and the land is covered most of the time with snow and ice. Gerald Newman shows you how these people survive in such a harsh environment in this Franklin Watts book.

Children of the Sun: The Pueblos, Navajos and Apaches of New Mexico In this book by Maudie Robinson, you'll visit the desert homes of Janito, Anson-ne and Geronimo, three native American children. You will meet their families and see

the customs that have been passed down for thousands of years. You will also see how the modern world has changed their way of life. The book is published by Julian Messner.

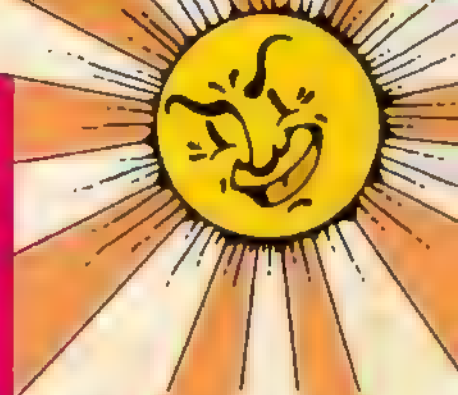


Mini-Desert

You can have a tiny desert in your own house. Just try this simple desert terrarium.

- 1.** Buy a few types of small cactus plants at a store.
- 2.** Clean and dry a large jar.
- 3.** Put gravel or small pebbles on the jar's bottom.
- 4.** Add a mixture of half soil and half sand. It must be deep enough to cover plant roots.
- 5.** Carefully plant your plants. If they have needles, do not touch them with your bare hands.
- 6.** Add just enough water to make the soil moist, but not soggy. Keep the soil moist until roots take hold. Then, water once a week.
- 7.** Put the terrarium in a sunny spot, and watch your desert grow.

Reviews



3-2-1 Contest

Imagine you're stranded in a hot desert. The sun is beating down on you. You're miles from anyone that could help. You know you could get out safely, but you only had a... a what? That's what we want you to tell us.

Dream up some sort of machine that can help you survive and get out of the desert. Draw your desert survival gadget, and tell us how it works. If we print your desert machine, we'll send you a CONTACT T-shirt.

Send your picture and description, plus your name, address and T-shirt size to:

3-2-1 Contest: Desert Survival
P.O. Box 599
Ridgefield, NJ 07657



Previews

Icy Museum

This review was sent in by Madhavi Gupta, Denver, CO.

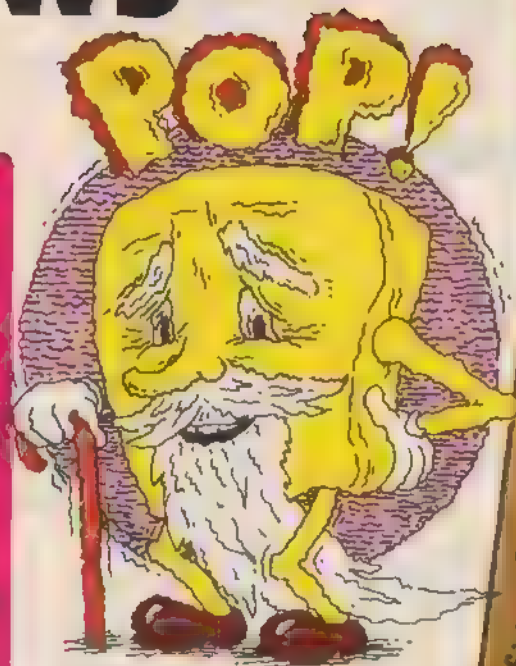
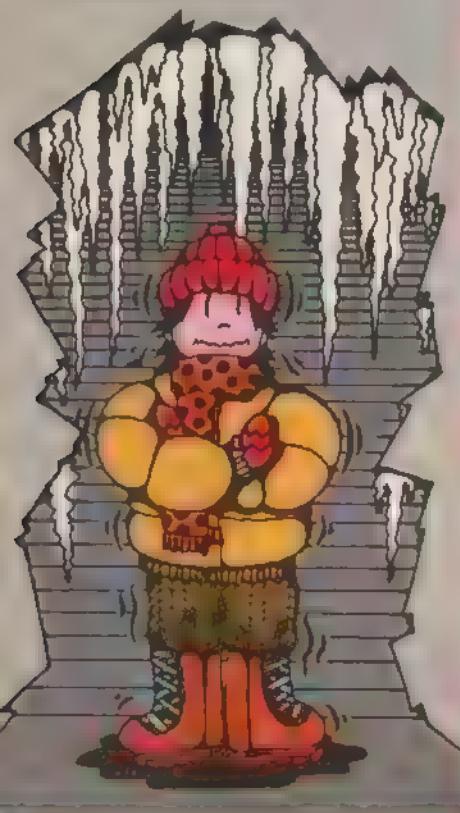
The Denver Museum of Natural History is in Colorado. It has everything from minerals to animals, including bears. It even has a cave of icicles.

My favorite part of the museum is the Indian exhibit. It has totem poles, and it is also very interesting.

Denver Museum of Natural History is really neat.

Have you been to a science museum lately? Why not write a review of 100 words or less and send it to us? If we use yours, you'll get a T-shirt. Send the review, your name, address and T-shirt size to:

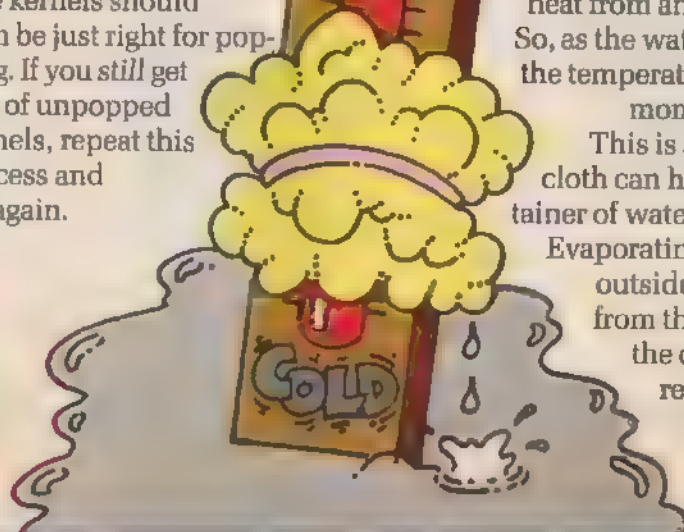
3-2-1 CONTACT
Museum Review
P.O. Box 599
Ridgefield, NJ 07657



POP!

In Any Questions? you found out how popcorn pops. But if your popcorn is too old, much of the water that helps it go pop may be gone. You'll be left with lots of unpopped kernels. Here's a way to put some life back into those stale, old corn kernels.

1. Put a cup of unpopped popcorn kernels into a jar.
2. Add one teaspoon of water to the jar.
3. Cover the jar and shake until all water is absorbed.
4. Leave the jar in a cool place for two days. The kernels should then be just right for popping. If you still get lots of unpopped kernels, repeat this process and try again.



Keep Cool

Some desert people use a strange way to cool containers of water. They wrap them in wet cloth.

To find out why that works, try this:

1. Put a thermometer where wind will hit it. Read the temperature after one half hour.

2. Wet a piece of cotton with slightly warm water. Using a rubber band, attach the wet cotton to the bottom of the thermometer. Again, take the temperature after one half hour. The temperature of the wet thermometer will be lower than that of the dry one.

Something caused the second temperature to be cooler. It wasn't the water itself, because that was warm.

It was evaporation.

Evaporating water pulls heat from anything it is on. So, as the water evaporated, the temperature of the thermometer dropped.

This is also how a wet cloth can help cool a container of water in the desert.

Evaporating water on the outside removes heat from the water inside the container. As a result, the water gets cooler.

Experiment

Solar Apple Cooker

On page 4, you found out about solar heating. But you don't have to live in the desert to use solar energy. Why not try some solar cooking? Here's how you can build a solar cooker.

What You Need

2 paper cups	aluminum foil
black construction paper	plastic food wrap
1 apple slice	scissors and tape
1 sheet of paper	

What You Do

1. Cover the inside (not bottom) of a paper cup with black paper. Tape it in place.
2. Put an apple slice in the cup.
3. Cover the cup with plastic wrap. Set it aside.
4. Cover the sheet of paper with aluminum foil. The paper should be 8½ by 11 inches (21 x 30 cm) or bigger. Make sure the shiny side of the foil faces out. The foil should be as smooth as possible.

5. Wrap the sheet of paper around the cup with the apple inside. The paper should form an ice cream cone shape. The foil should be on the inside of the cone. (The middle picture.) Tape the cone in place.
6. Stick the cone inside the second cup. This will help keep everything in place. Your solar cooker is ready.
7. Place your solar cooker in the sun. Make sure the sunlight is shining into the cup. You may have to put rocks around the cooker so that it doesn't tip over. After a couple of hours, look and see what has happened to your apple.

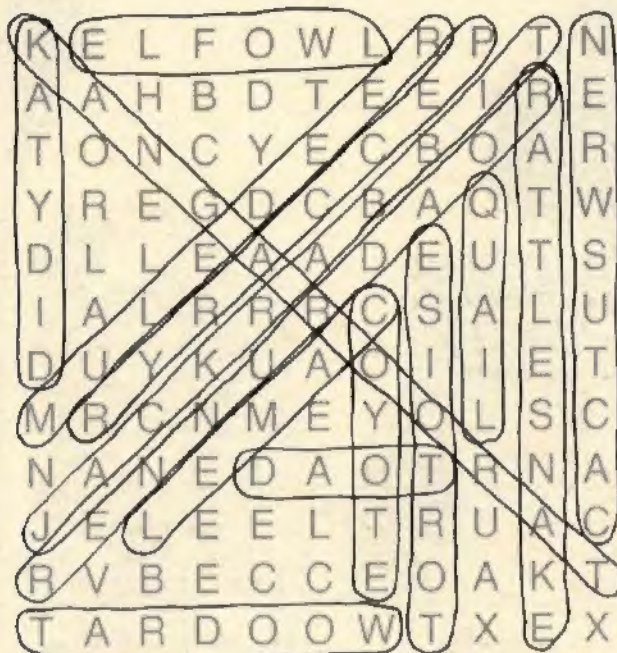
Why It Works

Sunlight strikes the aluminum foil cone and reflects into the paper cup. There, the black paper absorbs the light and turns it into heat. Normally, the heat would rise back up into the air. But the plastic wrap traps the heat inside the cup. It builds up, and cooks your apple.



Did It!

Desert Animal Hunt (page 27)



Thank You! Special thanks to student interns Judy Casulli, Suzanne Martinucci and Rosette Reiss for their help in putting together this month's issue.

Oops! On page 5 of the February, 1982, issue, in our look at animal teeth, we goofed. Unlike birds, lizards and turtles, frogs *do not* have an egg tooth.

Credits

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Next Month!

Here's a sample of what you'll find in the next issue of 3-2-1 CONTACT:

Sea Cow

Read all about the manatee, one of the most gentle animals in the sea.

Bloodhound Gang

The exciting conclusion of "The Case of the Whispering Pirate."

Zzzzz

Find out about the mysteries of sleep and the world of dreams.

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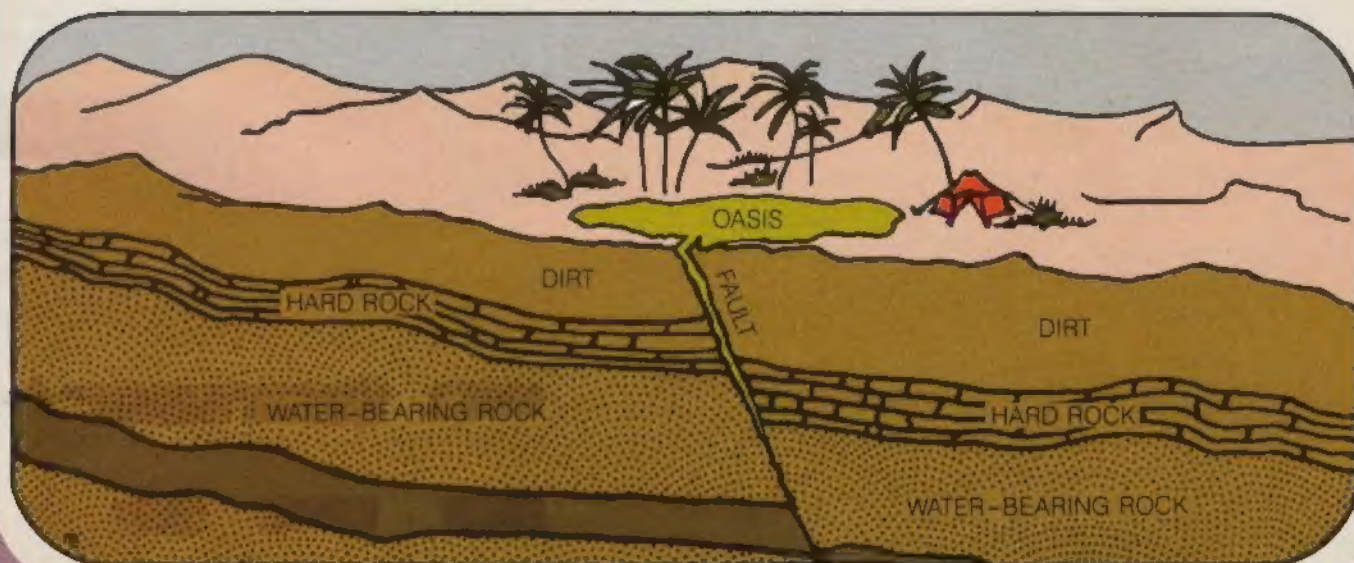
Earthfacts: Oases by Marilou Carlin

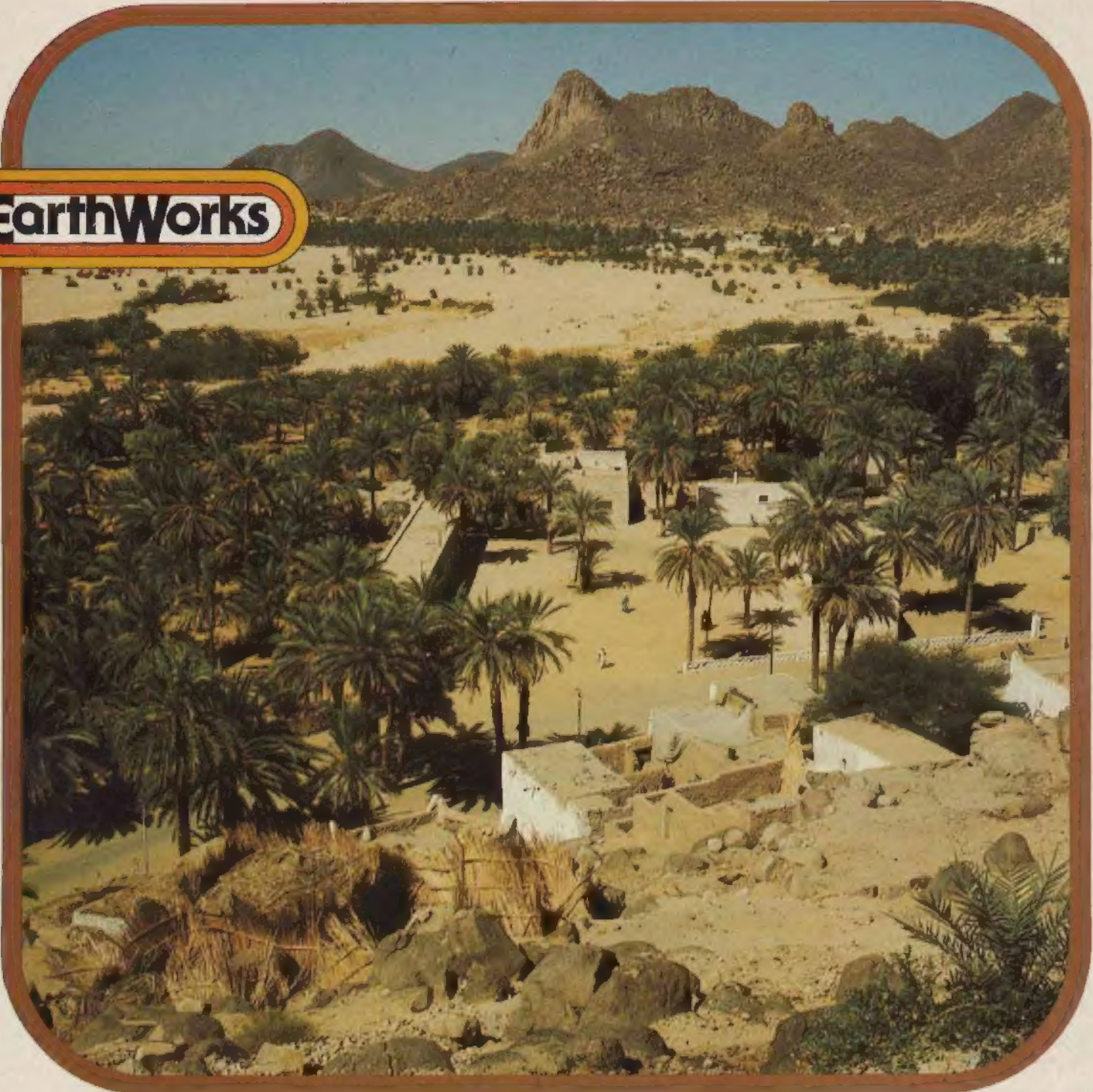
Each month CONTACT will bring you another Earth Works. Save these pages in a notebook. Soon you will have your own guide to the wonders of the planet earth.

EarthWorks

- An oasis is any spot in the desert where water is found. This water usually comes from deep underground springs or wells. Where it reaches the earth's surface, green trees and crops grow in the middle of the desert.
- Nearly two million people live in the larger oases in Africa's Sahara Desert. Other oases are so small, only a few families live there.
- Oases get their water from the ground. But that water often begins as rain which falls hundreds of miles away. Rain water soaks into the earth and flows through layers of rock. Then in certain spots, it reaches cracks in the rock. The water is forced up through these cracks to the surface by the pressure of all that dirt and rock weighing down on it. That's how an oasis begins.
- In the Sahara, people sometimes improve the water supply for an oasis by drilling wells. They dig down to the layer of rock where the water lies. Then the water spurts up the well hole just as it gets pushed up through natural cracks in the rock. It needs no pumping.
- Human-made wells that don't need pumps are *artesian* (ar-TEE-zhun) wells. They have been used on oases for a long time. Sometimes, in ancient Egypt, 5,000-foot wells were dug.
- Today people can build their own oases. They use modern equipment to drill 7,000-foot artesian wells. The water from these wells is often too hot to be used right away. A tower must be built so the water first can be cooled down. When it reaches the right temperature, the water is used to irrigate crops.
- Most oases in North America get their water from the nearby mountains. Rain water or melted snow flows down from the mountain tops. It makes its way into the desert valleys. Here it may form a small beautiful lake.
- Desert soil looks like it couldn't grow a thing. But it is rich in minerals that help plants grow. Just water is missing. Once that is supplied, orange trees grow well in oases. So do olive, peach and apricot trees. They thrive when water reaches the rich desert soil.

Here's one way an oasis can form. Water flows through underground rock and reaches a crack or *fault*. Then it rises up through the fault. Water is forced upward by the pressure of the rock and dirt which weigh down on it. When this water reaches the earth's surface, you'll see an oasis.





EarthWorks

Oases

If you were ever lost in the desert, this is the sort of place you would want to find. It's an oasis. It could save your life, just as an oasis once saved the life of an explorer named Sven Hedin.

He set out to cross a desert with four other people, eight camels and two dogs. But a month later, two people and seven camels had died for lack of water. Sven and the others survived only because they were lucky enough to reach an oasis. Without it, he never would have lived to tell his story.

To find out more about oases, turn to page 39.

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